TETRA TECH

Reference No.: 56
Smokey Mountain Smelters
EPA ID No. TND098071061

April 22, 2009

Mr. John Nolen
Remedial Project Manager
U.S. Environmental Protection Agency Region 4
61 Forsyth Street, SW, 11th Floor
Atlanta, Georgia 30303

Subject: **Final Sampling and Analysis Plan**
Integrated Assessment Sampling Event
Smokey Mountain Smelters
EPA Identification No. TND098071061
EPA Contract No. EP-W-05-054 (START III Region 4)
Technical Direction Document (TDD) No. TTEMI-05-003-0001

Dear Mr. Nolen:

The Tetra Tech (Tetra Tech) Superfund Technical Assessment and Response Team (START) is submitting the final sampling and analysis plan for the integrated assessment sampling event at the Smokey Mountain Smelters site located in Knoxville, Knox County, Tennessee. The proposed technical approach has been prepared in accordance with the U.S. Environmental Protection Agency (EPA) Performance Work Statement for the subject contract dated December 29, 2005.

Please contact me at (518) 356-3793 or Sandra Harrigan at (678) 775-3088 if you have any questions regarding this sampling plan.

Sincerely,

Sandra Harrigan
START III Site Manager

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Enclosure

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FINAL
SAMPLING AND ANALYSIS PLAN
INTEGRATED ASSESSMENT SAMPLING EVENT

SMOKEY MOUNTAIN SMELTERS
KNOXVILLE, KNOX COUNTY, TENNESSEE

EPA ID No. TND098071061

Revision 1

Prepared for

U.S. ENVIRONMENTAL PROTECTION AGENCY
Region 4
Atlanta, Georgia 30303

Contract No.	:	EP-W-05-054
TDD No.	:	TTEMI-05-003-0001
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1.0 INTRODUCTION

Under Superfund Technical Assessment and Response Team (START) Contract Number (No.) EP-W-05-054, Technical Direction Document No. TTEMI-05-003-0001, U.S. Environmental Protection Agency (EPA) tasked Tetra Tech EM Inc. (Tetra Tech) to prepare a sampling and analysis plan (SAP) for an integrated assessment sampling event at the Smokey Mountain Smelters (SMS) site (EPA Identification No. TND098071061). The purpose of the SAP is to specify the type, number, and location of samples to be collected during the integrated assessment sampling event, as well as describe the sampling methodology to be followed. The integrated assessment sampling event will be conducted by Tetra Tech and Response Engineering and Analytical Contract (REAC) personnel in support of the EPA Superfund Site Evaluation Section and the Emergency Response and Removal Branch. Information collected during the integrated assessment will be used to support the preparation of a Hazard ranking System (HRS) documentation package for proposed listing on the National Priorities List (NPL) and a removal action at the site. All activities and procedures discussed and described in this SAP will be conducted in accordance with the approved Tetra Tech Quality Management Plan (Reference [Ref.] 1). To further ensure that all data quality objectives are met, Tetra Tech will perform site activities in accordance with the prescribed guidance documents listed below:

- EPA Region 4 Science and Ecosystem Support Division (SESD) Field Branches Quality System and Technical Procedures
- EPA Contract Laboratory Program (CLP) Statement of Work (SOW) for Organics Analysis Multi-Media, Multi-Concentration (SOM01.2), April 2007
- EPA CLP SOW for Inorganic Analysis Multi-Media, Multi-Concentration (ILM05.4), December 2006
- EPA National Functional Guidelines for Superfund Organic Methods Data Review, EPA540/R-07/003, June 2008
- EPA National Functional Guidelines for Inorganic Data Review, EPA540-R-04/004, October 2004
- EPA Data Validation Standard Operating Procedures (SOP) for CLP Routine Analytical Services, Revision 2.1, July 1999

These guidance documents specifically apply to selection of sampling locations, sample types, sampling procedures, use of data, data types, field quality assurance and quality control (QA/QC) samples, and sample analyses (Refs. 2 through 7).

The primary objectives of the integrated assessment are to determine the volume of waste present on site, to fill data gaps identified during the HRS evaluation for proposed NPL listing prior to the completion of an on-site removal action, and to collect waste samples for reactivity/treatability testing. The NPL identifies sites at which a release or threatened release of hazardous substances poses a significant risk to public health or the environment to warrant further investigation and possible remediation under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), and the Superfund Amendments and Reauthorization Act of 1986 (SARA).

The general purposes of the integrated assessment sampling event are to further characterize the presence and nature of contamination and to assess and evaluate the need for further investigation under CERCLA. Integrated assessment sampling activities at the SMS site will include the following:

- Collection of samples to support attribution of hazardous substances to site operations
- Collection of waste samples for reactivity/treatability testing
- Measurement of the waste pile to document the area of the waste pile. This information will be used in conjunction with previously collected depth information to determine the estimated volume of the waste pile.
- Collection of samples to establish background levels
- Collection of surface soil samples from the apartment building adjacent to the site to evaluate the resident population threat of the soil exposure pathway
- Collection of samples to establish an observed release to the surface water body that receives runoff from the site
- Collection of ground water well samples from nearby residential properties to determine whether site operations have impacted the underlying and surrounding ground water
- Collection of any other missing HRS data

Information gathered during this sampling event will be used to generate an HRS score. The HRS score is the primary criterion EPA uses to determine whether a site should be placed on the NPL.

The remainder of this SAP for the integrated assessment sampling event at the SMS site is organized as follows:

- Section 2.0 describes the site and its environmental setting, presents facility background information and findings of previous investigations, and discusses the potential source areas.
- Section 3.0 discusses HRS concerns for the ground water migration, surface water migration, and soil exposure pathways.

- Section 4.0 summarizes proposed field sampling activities, including proposed sampling locations, to confirm preliminary data, fill data gaps, and determine whether further action is appropriate. This section also describes proposed sampling methods.
- Section 5.0 describes data quality objectives.
- Section 6.0 summarizes analytical methodology.
- Section 7.0 describes field work activities and presents the field team and its responsibilities.
- Section 8.0 discusses the disposal of investigation-derived waste (IDW).
- Appendix A provides figures showing the site location, site features, and proposed sampling locations.
- Appendix B provides tables summarizing sampling information for this integrated assessment sampling event.
- Appendix C provides the site-specific quality assurance project plan (QAPP).

Information obtained from the Tennessee Department of Environmental Conservation (TDEC) (formerly Tennessee Department of Conservation [TDOC] and Tennessee Department of Health and Environmental Conservation [TDHEC]) during the 2005 expanded site inspection and from the REAC technical support and sampling activities conducted in October and December 2006 were used in the preparation of this SAP for the SMS site (Refs. 8; 9).

2.0 SITE BACKGROUND

This section describes the site and its environmental setting, discusses current and past operations, summarizes previous investigations, and discusses potential source areas.

2.1 SITE DESCRIPTION AND ENVIRONMENTAL SETTING

SMS is located at 1508 Maryville Pike, Knoxville, Knox County, Tennessee, in the eastern portion of the state (Refs. 11; 12). Specifically, the geographic coordinates for SMS, as measured from the southwest corner of the on-site building, are 35° 55' 08.21" north latitude and 83° 55' 37.46" west longitude, as shown in Figure 1, Appendix A (Refs. 12; 13). The 13-acre property is bordered by mixed residential and commercial properties to the north, an apartment complex to the east, an undeveloped wooded area to the south, and both residential and commercial properties to the west (Refs. 11; 12; 14). The residential areas

surrounding the SMS site are low density with large areas that are wooded and undeveloped (Refs. 12; 15).

Historic features on the SMS property include an industrial process building, an inactive fertilizer factory, and a large waste pile covering most of the southern portion of the property (Ref. 8, p. 3). The industrial process building housed two natural gas-fired rotary furnaces, one casting furnace, and a large overhead crane, and provided dry storage for raw materials. Large air ducts lead to two outside baghouses near the southwest corner of the building. A portion of the north and east walls of the industrial process building are currently collapsed. Other areas on the property included a small transformer area, a burned office building with truck scales, railroad tracks, a maintenance building, and a pond (Ref. 8, p. 3). During a site investigation conducted in 2006, REAC identified the following features on the SMS property: process building, a large waste pile, and a pond, as shown in Figure 2, Appendix A (Refs. 9, p. 33). The waste pile is mostly devoid of vegetation (Refs. 9, pp. 33, 56; 14). No other structures or features on the SMS property were identified during the 2006 investigation.

The pond located on the SMS property and all surface water runoff from the site flows to the East Branch of Flenniken Branch. The East Branch of Flenniken Branch flows 1.25 miles and converges with Flenniken Branch. Flow continues south for about 1 mile where the Branch converges with the Loudoun Reservoir in the Tennessee River at river mile 637.5. Loudoun Reservoir is a popular recreation area that is used for boating and fishing (Refs. 15; 16).

2.2 FACILITY BACKGROUND INFORMATION

From 1922 to 1948, Knoxville Fertilizer Company operated a fertilizer factor on the SMS property. A sulfuric acid tank, a 30,000-gallon water tank, a deep well, a 70,000-gallon reservoir, and a nitre house were located on the property (Refs. 8, p. 4; 17, pp. 1 to 5). A 1966 topographic map shows two settling ponds on site (Ref. 18). The purpose of the ponds has not been determined. Based on the 1966 topographic map, the ponds appear to be in the same location as the current on-site pond (Refs. 9, p. 33; 18). Available information indicates that ownership of the property changed numerous times between 1948 and 1979. However, during this time site operations continued in manufacturing of agricultural products such as fertilizer (Ref. 8, pp. 4, 5).

SMS, Inc., (also known as Rotary Furnace, Inc.) in Knoxville, Tennessee was established in 1979 (Ref. 19, pp. 1 to 5). SMS, Inc., operated an aluminum smelter (aluminum furnace) on the property (Refs. 10;

20). Specific operational details have not been identified. In 1985, SMS, Inc., received a permit from Knox County Department of Air Pollution Control (KCDAPC) to operate Rotary Aluminum Recovery Furnace #1 (Ref. 20, pp. 1, 2). From 1983 to 1989, KCDAPC received complaints and was issued violations for open burning and heavy emissions from the facility (Refs. 21; 22, p. 1). A 1983 KCDAPC field activity report indicates that a landfill (Witherspoon and Johnson Dump) was located on the southern portion of the SMS property. Demolition and industrial waste as well as slag and cinders from furnace operations were disposed of in the landfill. Evidence of burned waste was found in the landfill (Refs. 23, 24; 25; 26). In addition, a 1983 TDEC report of geologic investigation indicates that the landfill was used for the disposal of "salt cake," which resulted from processing aluminum ore (Ref. 27, p. 1). Based on historical records, the former landfill appears to have been in the same location as the exterior (salt cake) waste pile currently on site, as shown in Figure 2, Appendix A (Ref. 24, p. 3, 4). During TDEC investigations between 1997 and 2002, the following wastes were observed on the SMS property: baghouse dust; dross; slag; large blocks of materials resembling spent anode or cathode materials from primary aluminum production; a suspected mixture of baghouse dust and dross/slag from secondary aluminum smelting; casting wastes, anode/cathode wastes; and dross/slag from primary aluminum production (Ref. 8, pp. 6, 8; 28, pp. 4, 9).

The Aluminum Company of America (Aloca) sent large quantities of wastes potentially containing hazardous substances to the SMS facility between 1985 and 1992 (Ref. 29, pp. 1 to 19). The wastes included dross, filters, furnace bottoms, oily scalper chips, tabular balls, salt cake, and pot pads (Ref. 29, pp. 11, 12, 13, 14, 15, 16, 17, 19, 20, 21, 24, 26, 28, 42, 46).

Waste by-products from aluminum smelter operations include secondary aluminum dross residues and baghouse and furnace dusts. Baghouse dusts may contain cadmium and lead above the limits of the EPA Toxicity Characteristics Leaching Procedure (TCLP) test (Ref. 30, pp. 25, 26). Dross residues are not classified as hazardous based on TCLP, but contain salts. Furnace dusts contain volatile elements of cadmium and mercury (Ref. 30, p. 26).

2.3 PREVIOUS INVESTIGATIONS

TDEC conducted site investigations of the SMS property in October 1987 and August 1988. During the investigations, TDEC collected eight waste, five surface soil, one drinking water well, four surface water, and six sediment samples (Ref. 28, pp. 4, 6, 9, 11, 15, 16, 17, 18, and Appendix 3, pp. 108 to 436). Analysis of waste samples collected from the waste pile showed that samples contained metals,

polynuclear aromatic hydrocarbons (PAH), and pesticides at elevated concentrations (Ref. 28, pp. 4, 15). The concentration of an analyte is considered elevated if the concentration is greater than or equal to the sample quantitation limit if not detected in the background sample, or three times the background concentration. The waste samples contained aluminum (up to 135,800 milligrams per kilogram [mg/kg]), mercury (up to 0.73 mg/kg), benzo(g,h,i)perylene (up to 2,100 micrograms per kilogram [µg/kg]), and other constituents with elevated concentrations (Ref. 28, pp. 15, Appendix 3, pp. 111 to 194).

Soil sample analytical results detected hazardous substances at elevated concentrations including metals and pesticides (Ref. 28, p. 19). Metals included aluminum (up to 73,500 mg/kg), antimony (up to 4.4 mg/kg), beryllium (up to 4 mg/kg), copper (up to 1,070 mg/kg), cyanide (up to 3.71 mg/kg), and mercury (up to 0.42 mg/kg) (Ref. 28, p. 19 and Appendix 3, pp. 217, 227, 277). The pesticides included alpha-chlordane (up to 127 µg/kg), gamma-chlordane (up to 61.0 µg/kg), dieldrin (up to 602 µg/kg), heptachlor (up to 27.8 µg/kg), and heptachlor epoxide (up to 54.3 µg/kg) (Ref. 28, p. 19 and Appendix 3, pp. 210, 211, 260, and 261). The drinking water sample contained an elevated concentration of aluminum (Ref. 28, pp. 6, 16). The surface water samples contained metals at elevated concentrations including aluminum (up to 2.160 micrograms per liter [µg/L]), antimony (up to 9.016 µg/L), arsenic (up to 0.005 µg/L), and chromium (up to 0.001 µg/L) (Ref. 28, p. 17). The sediment samples contained metals and PAHs at elevated concentrations. Metals included aluminum (up to 80,900 mg/kg), antimony (up to 12.2 mg/kg), barium (up to 155 mg/kg), cadmium (up to 5.0 mg/kg), chromium (up to 64 mg/kg), and copper (up to 1,380 mg/kg) (Ref. 28, pp. 9, 18 and Appendix 3, p. 299). The PAHs included bis(2-ethylhexyphthalate), diethyl phthalate, benzo(a)anthracene, fluoranthene, pyrene, and chrysene (Ref. 28, p. 18 and Appendix 3, pp. 292, 312, 320, 332, and 342).

In 2002, TDEC conducted an expanded site inspection (ESI) at the SMS property. During the ESI, TDEC collected six waste, 15 sediment, nine surface water, and one ground water samples from the SMS property and receiving surface water bodies (Ref. 8, pp. 1, 9, 11). The waste samples were collected from the waste pile on the southern portion of the SMS property and from waste piles in the process building (Ref. 8, p. 9). The waste samples contained aluminum (up to 130,000 mg/kg), antimony (up to 18 mg/kg), arsenic (up to 16 mg/kg), cyanide (up to 5.8 mg/kg), mercury (up to 1.4 mg/kg), benzo(a)anthracene (up to 7.4 mg/kg), benzo(b)fluoranthene (up to 19 mg/kg), benzo(k)fluoranthene (up to 18 mg/kg), benzo(b)pyrene (12 mg/kg), chrysene (up to 35 mg/kg), and fluoranthene (up to 43 mg/kg) (Ref. 8, p. 12). The sediment and surface water samples contained elevated concentrations of aluminum and copper (Ref. 8, pp. 25, 27). The ground water sample contained antimony and arsenic above their

respective EPA maximum contaminant levels (MCL) (Ref. 8, p. 18, 19). During the ESI, a leachate seep was observed entering the surface water from the waste pile (Ref. 8, p. 26).

In December 2006, EPA directed REAC to conduct a site investigation at the SMS property (Ref. 9, pp. 1, 37). During the site investigation, a structurally unstable building (the process building) was observed on the property. The building housed rotary and casting furnaces. Piles of smelting waste remained in the building and used bag filters and bag filter dust were present in the baghouse area adjacent to the building. Aluminum smelting waste (waste pile) covered the southern area of the property. The East Branch of Flenniken Branch was observed on the east side of the property. A pond (lagoon) on the east side of the property fed a tributary of East Branch of Flenniken Branch, as shown in Figure 2 in Appendix A (Refs. 9, p. 1; 12).

During 2006 REAC site investigation, samples were collected from the waste pile and the leachate seep flowing from the waste pile and the East Branch of Flenniken Branch. The waste pile samples contained numerous metals, acetone, PAHs, pesticides, and polychlorinated biphenyls (PCB). In particular, the waste samples contained notable concentrations of aluminum (up to 217,000 mg/kg) (Ref. 9, p. 24); acetone (up to 429 µg/kg) (Ref. 9, pp. 17, 148, 169); PAHs (up to 177,000 µg/kg) (Ref. 9, pp. 19, 171, 196); gamma chlordane (up to 1,210 µg/kg) (Ref. 9, pp. 21, 171); and PCBs (up to 4,580 µg/kg) (Ref. 9, pp. 21, 170). The leachate sample contained acetone, 2-butanone, and numerous metals, notably aluminum up to 935 µg/L (Ref. 9, pp. 2, 26, 27, 29, 156, 175, 328). The surface water sample contained numerous metals including aluminum, antimony, arsenic, and mercury (Ref. 9, pp. 8, 328, 346, 348).

2.4 POTENTIAL SOURCE AREAS

Based on TDEC inspections and the REAC sampling investigation, three potential source areas have been identified on the SMS property: the aluminum dross waste pile located inside the on-site building, the salt cake waste pile located outside of the on-site building, and the leachate seep from the salt cake waste pile. The salt cake waste pile was used for the disposal of aluminum smelting wastes (Refs. 8, pp. 3, 5, 6, 7, 8; 9, pp. 1, 31). The estimated volume of the salt cake waste pile is about 854,024 cubic feet (ft^3) (Refs. 9, p. 56; 14). The estimated depth of salt cake waste pile is 15 to 25 feet (Ref. 9, p. 56 and Appendix H). The waste was disposed of in a small valley, a stream, and two earthen dams (Refs. 8, p. 4; 9, p. 56).

During the 2006 REAC site investigation, samples were collected from borings advanced into the salt cake waste pile. The boring extractions contained fill material covered by sand and silt, underlain by clay

(Ref. 9, pp. 6, 36, 104, 105, 106, 113). Analytical results of samples collected from the salt cake waste pile detected metals, acetone, and PAHs (Ref. 9, pp. 6, 7, 17 to 24). During the investigation, the salt cake waste pile was devoid of vegetation and was composed of gray smelter waste (Ref. 9. p. 56). In addition, during the 2006 investigation, REAC also observed a leachate seep flowing from the salt cake waste pile into the East Branch of Flenniken Branch (Ref. 9, pp. 2, 35). A sample was collected from the leachate seep and analytical results showed the presence of aluminum, antimony arsenic, copper, mercury, vanadium, acetone, and 2-butanone (Ref. 9, pp. 1, 2, 26, 27, 28, 29, 159, 178, 328, 347).

3.0 HAZARD RANKING SYSTEM CONCERNS

The SMS site is located in the Valley and Ridge physiographic province characterized by numerous ridges and intervening valleys trending in the northeast-southwest direction. The Valley and Ridge aquifer consists of extensively folded and faulted carbonate, sandstone, and shale underlying the SMS site, which is characterized by extensive karst development. Information collected by TDEC during the ESI indicated that about 1,500 people receive their drinking water from ground water sources within 4 radial miles of the site (Ref. 8, pp. 16, 17). During a recent private well survey, EPA and REAC identified about 26 private wells within 1 radial mile of the SMS site.

Surface water runoff from the salt cake waste pile and the leachate seep flows to the East Branch of Flenniken Branch. The East Branch of Flenniken Branch flows 1.25 miles from the salt cake waste pile until it converges with Flenniken Branch. Flow continues south for about 1 mile until it converges with the Loudoun Reservoir in the Tennessee River at river mile 637.5 (Ref. 15). In 2006, REAC collected a surface water sample from the East Branch of Flenniken Branch. The surface water sample contained acetone, aluminum, antimony, arsenic, and mercury (Ref. 9, pp. 2, 26, 27, 28, 29, 35, 155, 328) (see Figure 3).

An apartment complex is located on the eastern boundary of the SMS property. No soil samples have been collected from the apartment complex. Aluminum smelters are known to release PAHs to the air. There is a potential that PAHs released from the SMS facility and settled into the soil at the apartment complex property. Collection and analysis of soil samples is necessary to determine whether releases from the SMS site are responsible for PAH-contaminated soil at the adjacent apartment complex property.

4.0 PROPOSED SAMPLING PLAN

The purpose of the integrated assessment sampling event is to (1) verify the HRS score by collecting additional samples to strengthen the surface water migration pathway, (2) determine whether nearby private drinking water wells have been impacted by past operations, (3) determine whether removal actions that directly address the waste materials are warranted at the site, (4) determine whether a soil exposure threat exists at the SMS property, (5) document background soil concentrations, (6) collect data to attribute releases from the site to past operations; and (7) collect waste samples for reactivity/treatability testing. Additionally, during this sampling event, the size of the waste pile will be verified. Tetra Tech will focus on collecting samples to support attribution of a release to the surface water migration and soil exposure pathways.

This section describes the proposed surface soil, residential well, surface water and sediment, and waste sampling activities. Figures 3 and 4 in Appendix A depict proposed sampling locations. Tables 1, 2, 3, 4, and 5, in Appendix B, outline the numbers and types of samples proposed and the rationale for each sampling station. Table 6 of Appendix B summarizes the QA/QC samples to be collected during field sampling activities. The analytical methodology is described in Section 5.0 of this SAP.

4.1 SURFACE SOIL SAMPLING

Tetra Tech and REAC will collect three surface soil samples from the apartment complex on the eastern boundary of the SMS property and one background surface soil sample for a total of four surface soil samples. To attribute potential contaminants detected in on-site samples, the background surface soil sample will be collected from an undisturbed location to be selected in the field. The soil samples from the apartment complex will be collected within the property boundary of the apartment complex and within 200 feet of the apartment building. Tetra Tech and REAC will determine the number of apartment units within the apartment building, and REAC or EPA will determine the total number of people living in the apartment building. The surface soil sampling locations are depicted on Figure 3 in Appendix A. Table 1 in Appendix B outlines the proposed sample identifiers and types, sampling depths, analytical parameters, sample containers, and sampling locations and rationales for the surface soil samples to be collected during the event. Surface soil samples will be collected using pre-cleaned stainless-steel hand augers or spoons and pre-cleaned stainless-steel bowls. Surface soil sampling activities will be conducted in accordance with the EPA Region 4 SESD Field Branches Quality System and Technical Procedures for Soil Sampling (Ref. 2).

4.2 RESIDENTIAL WELL SAMPLING

Tetra Tech and REAC will collect ground water from 14 potable wells at residential properties surrounding the site. Access agreements from property owners will be provided by EPA. At each sampling location, REAC and Tetra Tech will request well depth and construction information from the property owners and complete a well survey. When collecting water samples from domestic wells where it is possible to locate the pressure tank and obtain access to an outside spigot, REAC and Tetra Tech will follow these procedures (provided by REAC):

1) Note the presence of any paints, solvents, glues, pesticides, herbicides, fuels, air conditioning, or other materials that may affect the result of the ground water sample.

2) Locate the pressure tank and examine the water system; note size of pressure tank and any treatment system (such as a water softener).

3) If possible, bypass any treatment system, and connect a garden hose to a spigot immediately after the pressure tank in order to discharge purge water to an appropriate discharge point.

4) If the pressure tank volume is not known, calculate the volume of water in the pressure tank using the formula $\pi r^2 h \times 7.48$, where r is the radius of the tank (in feet); h is the height of the tank (in feet); and 7.48 is the conversion factor for converting cubic feet into gallons.

5) Start the discharge and estimate the flow volume using a bucket and a stopwatch; the amount of time to purge the pressure tank will be the total volume of the tank divided by the flow rate.

6) After three or more volumes of water are removed from the pressure tank, collect a sample into the appropriate container as listed in Table 2 of Appendix B. Before collecting the sample, disconnect the garden hose and collect the sample directly from the spigot. Throttle back the flow to a trickle so as to minimize the agitation of the sample.

If no outside spigot is available, REAC and Tetra Tech will use the flowing procedure (provided by REAC):

1) Purge the system by opening an inside faucet and allowing water to run for at least 15 minutes so that the well pump is activated and the system has completely flushed. If possible, any treatment system should be bypassed.

2) Reduce flow at the faucet before collecting a sample.

Table 2 in Appendix B outlines the proposed sampling locations and rationales for the residential well samples to be collected during the event.

4.3 SURFACE WATER AND SEDIMENT SAMPLING

Tetra Tech and REAC will collect one collocated surface water and sediment sample from the East Branch of Flenniken Branch at the point on site where the leachate enters the East Branch of Flenniken Branch. Tetra Tech and REAC will also collect one collocated surface water and sediment sample 20 feet downstream from this location. To document background surface water and sediment concentrations, Tetra Tech and REAC will collect one collocated background surface water and sediment sample in the East Branch of Flenniken Branch outside the influence of the SMS property.

Tables 3 and 4 in Appendix B outlines the proposed sample identifiers and types, sampling depths, analytical parameters, sample containers, and sampling locations and rationales for the surface water and sediment samples to be collected during the event. Surface water samples will be collected from the surface of the water by partially submerging the sampling container into the water. Sediment samples will be collected at a depth of 0 to 3 inches below land surface from the steam bank or noticeable depositional areas using pre-cleaned stainless-steel hand augers or spoons and pre-cleaned stainless-steel bowls. Stainless-steel spoons and bowls will be dedicated to each sampling location. On-site surface water and sediment sampling locations are depicted on Figure 3 in Appendix A, and off-site surface water and sediment sampling locations are depicted on Figure 4 in Appendix A. Surface water and sediment sampling activities will be conducted in accordance with the EPA SESD Region 4 EPA Region 4 SESD Field Branches Quality System and Technical Procedures for Surface Water and Sediment Sampling (Ref. 2).

4.4 WASTE SAMPLING

Tetra Tech and REAC will collect seven waste samples during the integrated assessment sampling event including: three waste samples from the salt cake waste pile, one leachate sample from the seep emanating from the salt cake waste pile, and three waste samples from the aluminum dross waste pile located in the on-site process building. Additionally, REAC will collect three 2-kilogram composite waste pile samples from piles in the process building and submit the samples to the REAC Engineering Evaluation Unit (EEU) for reactivity testing.

Table 5 in Appendix B outlines the proposed sample identifiers and types, sampling depths, analytical parameters, sample containers, and sampling locations and rationales for the waste samples to be collected during the sampling event. Figure 3 in Appendix A depicts the locations of the salt cake waste

pile and leachate samples. Waste samples will be collected using pre-cleaned stainless-steel hand augers or spoons and pre-cleaned stainless-steel bowls. Waste sampling activities will be conducted in accordance with the EPA Region 4 SESD Field Branches Quality System and Technical Procedures for Waste Sampling (Ref. 2).

5.0 DATA QUALITY OBJECTIVES

Sampling and laboratory analysis will be conducted to determine the presence or absence of site-related contaminants in soil, surface water, sediment, waste, and ground water underlying and in the vicinity of the SMS property. Analytical data for environmental and waste samples collected will be evaluated to assess whether (1) contaminant concentrations are present above sample-specific and analyte-specific minimum reporting limits (MRL), (2) concentrations exceed comparison criteria and background levels, and (3) observed releases of contaminants have occurred. The MRL is the analyte concentration that corresponds to the lowest demonstrated level of acceptable quantitation. The MRL accounts for preparation weights and volumes, dilutions, and moisture content in solid samples.

Analytical results will be compared with background concentrations for all media sampled, and to the comparison criteria listed below. Constituents that are present in the on-site soil and waste samples at elevated concentrations and also are elevated in the ground water, surface water, sediment, and/or residential soil samples will be evaluated as observed releases, as specified in the HRS rule.

Analytical data results will be compared with the following criteria:

- EPA Superfund Chemical Data Matrix benchmarks for HRS scoring: http://www.epa.gov/superfund/sites/npl/hrsres/tools/scdm.htm
- EPA Maximum Contaminant Levels: http://www.epa.gov/safewater/consumer/pdf/mcl.pdf
- EPA 2008 Regional Soil Screening Levels: http://epa-prgs.ornl.gov/chemicals/index.shtml

Initial acceptance of the data will be determined by the EPA Region 4 SESD Office of Quality Assurance through the CLP data validation process. Any rejected data, and the reasons for their rejection, will be summarized in the data validation report. Additionally, Tetra Tech will evaluate the data results using the HRS rule and the EPA fact sheet on using qualified data to document an observed release and observed contamination (Refs. 31; 32). Sample results will be reviewed to ensure that concentrations were detected above the sample- and analyte-specific MRLs.

The type and number of environmental and waste samples collected will be biased to identify source locations and to document observed releases of site-related contaminants to the ground water migration, surface water migration, and soil exposure pathways. QA/QC samples will be collected during the sampling event to monitor variations with sample collection, sample handling, equipment decontamination, and laboratory analytical procedures. Table 6 of Appendix B summarizes the sample identifiers, types, and sampling rationales for all proposed QA/QC samples.

6.0 ANALYTICAL METHODOLOGY

All samples will be submitted to either the EPA CLP or the Region 4 SESD Analytical Support Branch (ASB) for analysis. Analytical parameters for the integrated assessment at the SMS site include: the EPA target compound list (TCL) volatile organic compounds (VOC), semivolatile organic compounds (SVOC), pesticides, and PCBs, in accordance with the EPA CLP SOW for Organics Analysis, Multi-Media, Multi-Concentration (SOM01.2); the EPA target analyte list (TAL) metals including cyanide and mercury, in accordance with the EPA CLP SOW for Inorganic Analysis, Multi-Media Concentration (ILM05.4); and chloride, in accordance with EPA method 300.0 (Refs. 3; 4; 5; 6; 7; 34). Any variations in the analytical methodology will be specified in the EPA laboratory assignment and subsequently in the final report. Tables 1 through 5 of Appendix B specify the analytical parameters for each sampling station and Table 7 of Appendix B summarizes the analytical methodologies for each sample matrix, the required sample containers, preservatives, and holding times. The QAPP is provided in Appendix C.

The EPA CLP and ASB analytical data packages will be validated by the EPA Region 4 SESD, Office of Quality Assurance. Data will be validated in accordance with the EPA CLP SOW for Organics Analysis, Multi-Media, Multi-Concentration (SOM01.2), April 2007; the EPA CLP SOW for Inorganic Analysis, Multi-Media, Multi-Concentration (ILM05.4), December 2006; the EPA National Functional Guidelines for Superfund Organic Methods Data Review, EPA540/R-07/003, June 2008; the EPA National Functional Guidelines for Inorganic Data Review, EPA540-R-04/004, October 2004; and the EPA Data Validation Standard Operating Procedure (SOP) for CLP Routine Analytical Services, Revision 2.1, July 1999 (Refs. 2; 3; 4; 5; 6; 7).

7.0 FIELD WORK SUMMARY

Tetra Tech and REAC will conduct integrated assessment sampling activities at the SMS site during the week of April 27, 2009. REAC will provide all the equipment and personnel for sample collection during the integrated assessment sampling event. REAC will also be responsible for decontamination of equipment used during field activities. Tetra Tech will be responsible for assisting with documentation of the sampling locations; collecting information to fill HRS data gaps; and sample management, processing, and shipment to the respective CLP laboratories for analyses. Tetra Tech will process all samples using the EPA Field Operations Records Management System (FORMS). Proposed sampling locations are described in Section 4.0 of this SAP and shown on Figures 3 and 4 in Appendix A. The Tetra Tech or REAC field team leader or the EPA On-Scene Coordinator (OSC) may change sampling locations and the number of samples to be collected in response to site conditions at the time of the integrated assessment sampling event. Sampling will be conducted, and QA/QC samples will be collected, in accordance with procedures documented in the EPA Region 4 SESD Field Branches Quality System and Technical Procedures (Ref. 2). Tetra Tech will follow the health and safety protocol during the sampling event that will be described in the separate site-specific health and safety plan (HASP).

Field team members and their responsibilities are as follows:

- Matthew Huyser, EPA — On-Scene Coordinator
- Don Bussey, EPA — REAC Work Assignment Manager
- Ken Woodruff, REAC — Field Team Leader, Removal
- Alicia Shultz, Tetra Tech — Field Team Leader, Site Assessment
- Quinn Kelley, Tetra Tech — Field Team Member
- To Be Determined, REAC — Field Team Member

All specific training requirements for personnel will be addressed in the site-specific HASP. EPA will be responsible for obtaining access to the SMS property, the apartment complex east of the SMS property, and the residential well sampling locations. EPA reserves the right to conduct oversight of sampling activities.

8.0 DISPOSAL OF INVESTIGATION-DERIVED WASTE

IDW will generally consist of disposable latex gloves, boot covers, plastic bags, and Tyvek. These items are used mainly for sample collection, to prevent cross-contamination, and to provide protection and sanitary conditions to personnel throughout sampling activities. If contact with concentrated wastes occurs, disposable gear and sampling supplies will be secured on site in a 55-gallon drum until analytical results are received. If analytical data reveal contamination at levels that require special handling, these wastes will be disposed of by a licensed transport and disposal firm. All IDW will be disposed of by REAC or EPA during the removal action planned for the site.

If, in the best professional judgment of the REAC field team leader or EPA OSC, disposable IDW can be rendered nonhazardous, disposable IDW will be double-bagged and deposited in an industrial waste container as directed in the IDW Management Guidance Manual (Ref. 33).

9.0 REFERENCES

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2. U.S. Environmental Protection Agency (EPA). Region 4 Science and Ecosystem Support Division (SESD), Field Branches Quality System and Technical Procedures. February 2008. On-Line Address: http://www.epa.gov/region4/sesd/fbqstp/index.html

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9.0 REFERENCES

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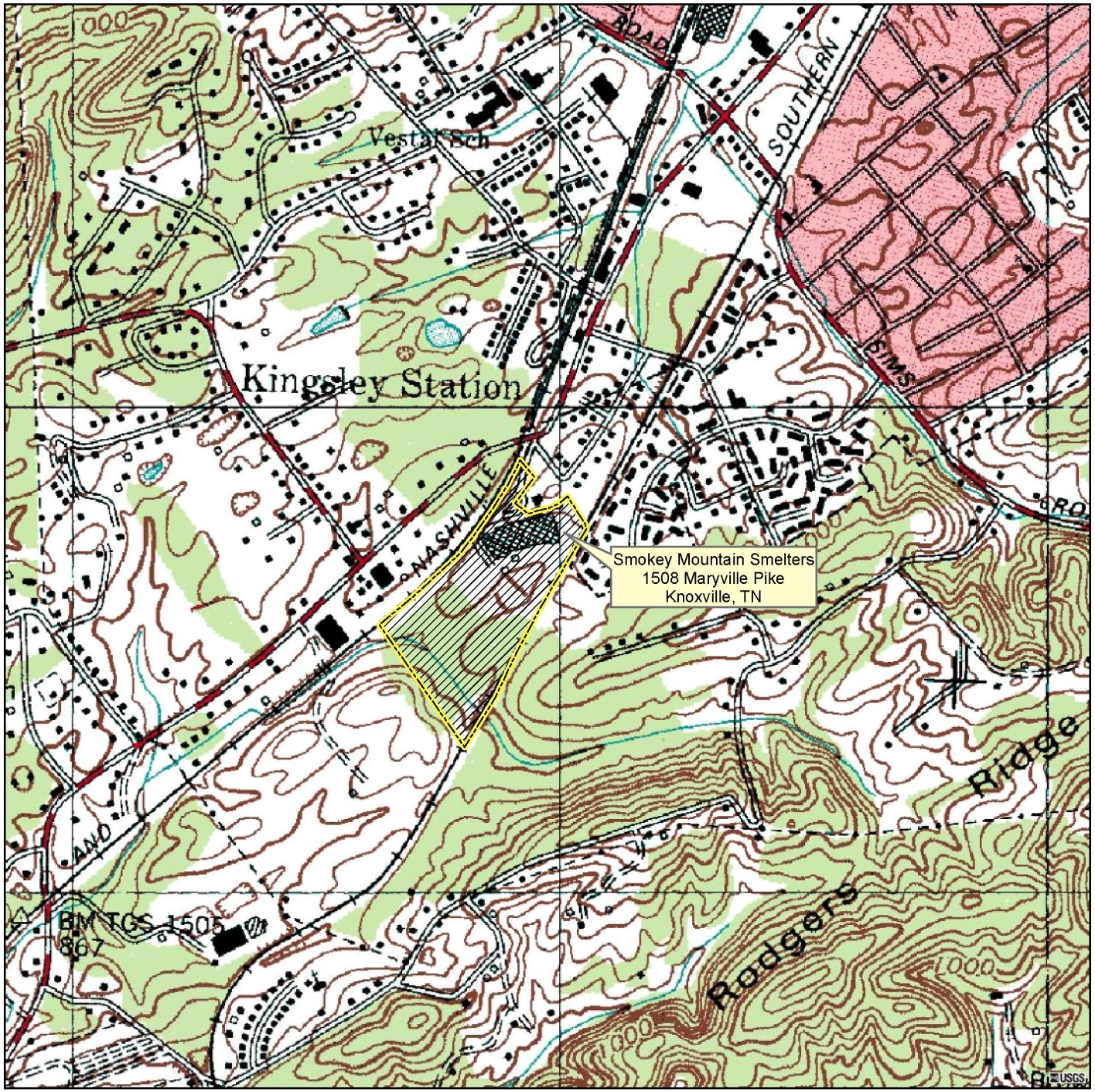
APPENDIX A

FIGURES

(Four Pages)

FIGURE

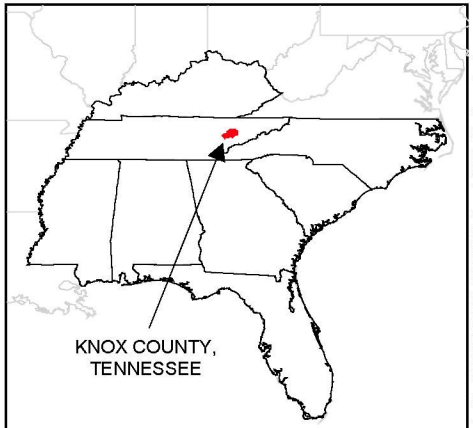
1 SITE LOCATION
2 SITE LAYOUT
3 ON-SITE SAMPLING LOCATIONS
4 OFF-SITE SAMPLING LOCATIONS



0 500 1,000 Feet

1:12,000

MAP SOURCE:
USGS, KNOXVILLE, TN
TOPOGRAPHIC QUADRANGLE, 1979



United States Environmental Protection Agency

SMOKEY MOUNTAIN SMELTERS
KNOXVILLE,
KNOX COUNTY,
TENNESSEE
TDD No.TTEMI-05-003-0001

FIGURE 1
SMOKEY MOUNTAIN SMELTERS
LOCATION

TETRA TECH

2009-3-06 I:\GIS_Workspace\TTEMI-05-003-0001_Smokey_Mountain_Smelters\Figures\GIS\MXDs\Site Location Maps\R IV START SITE LOC MAP 3-06-09.mxd TTEMI-KY dale vonbusch

LEGEND

- Surface Water Body
- Railroad Tracks
- Approximate Property Boundary
- Process Building
- Waste Pile
- Settling Pond

0 150 300 Feet

1:3,600

N

United States Environmental Protection Agency

SMOKEY MOUNTAIN SMELTERS
KNOXVILLE,
KNOX COUNTY,
TENNESSEE
TDD No.TTEMI-05-003-0001

FIGURE 2
SMOKEY MOUNTAIN SMELTERS
FACILITY LAYOUT

TETRA TECH

2009-4-15 \GIS_Workspace\TTEMI-05-003-0001_Smokey_Mountain_Smelters\Figures\GIS\MXDs\Site Layout Maps\SMS SITE LAYOUT MAP 4-15-09.mxd TTEMI-KY dale vonbusch

LEGEND

Sample Locations

- Sediment and Surface Water
- Soil
- Waste

Site Features

- Surface Water Body
- Railroad Tracks
- Approximate Property Boundary
- Process Building
- Waste Pile
- Settling Pond

Notes:
SD - Sediment sample
SMS - Smokey Mountain Smelters
SF - Soil sample
SW - Surface Water
WA - Waste sample
Three waste samples will be collected from waste piles in the process building.

0 150 300 Feet

1:3,600

N

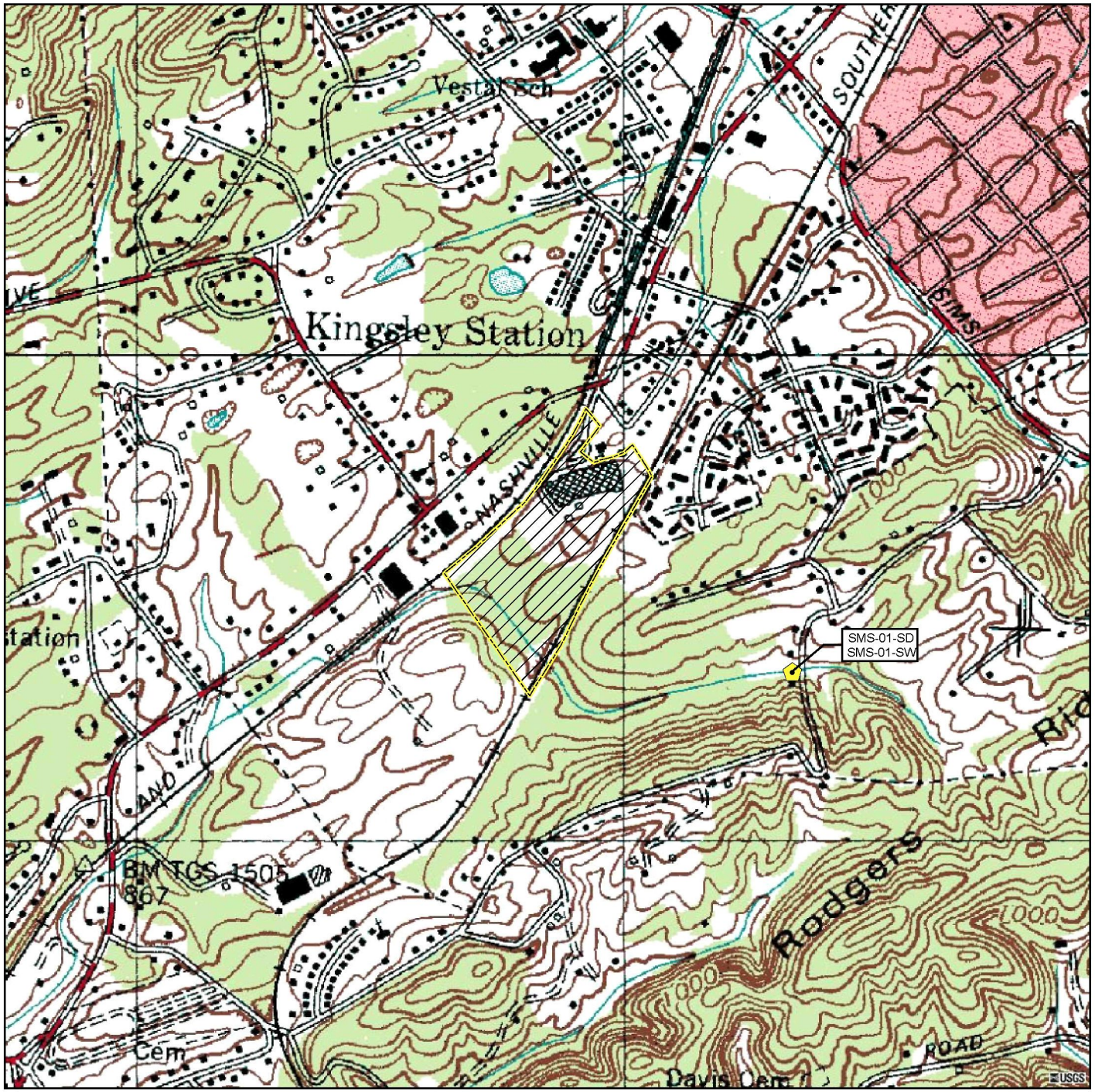
United States Environmental Protection Agency

SMOKEY MOUNTAIN SMELTERS
KNOXVILLE,
KNOX COUNTY,
TENNESSEE
TDD No.TTEMI-05-003-0001

FIGURE 3
ON-SITE
SAMPLING LOCATIONS

TETRA TECH

2009-4-16 \GIS_Workspace\TTEMI-05-003-0001_Smokey_Mountain_Smelters\Figures\GIS\MXDs\Sampling Locations\SMS ON-SITE SMPL LOCS 4-16-09.mxd TTEMI-KY dale vonbusch



LEGEND

Sample Locations

Background Sediment and Soil

Site Features

Approximate Property Boundary

Notes:
SD - Sediment sample
SMS - Smokey Mountain Smelters
SW - Surface Water
Domestic well samples will be collected.
The locations of the domestic wells will be provided by EPA and provided in the field trip report documenting this sampling event.

0 500 1,000 Feet

1:12,000

United States Environmental Protection Agency

SMOKEY MOUNTAIN SMELTERS
KNOXVILLE,
KNOX COUNTY,
TENNESSEE
TDD No.TTEMI-05-003-0001

FIGURE 4
OFF-SITE
SAMPLING LOCATIONS

TETRA TECH

2009-4-16 I:\GIS_Workspace\TTEMI-05-003-0001_Smokey_Mountain_Smelters\Figures\GIS\MXDs\Sampling Locations\SMS OFF-SITE SMPL-LOCS 4-16-09.mxd TTEMI-KY dale vonbusch

APPENDIX B

TABLES

(12 Pages)

TABLE

1 SOIL SAMPLING LOCATIONS AND RATIONALE
2 RESIDENTIAL WELL SAMPLING LOCATIONS AND RATIONALE
3 SURFACE WATER SAMPLING LOCATIONS AND RATIONALE
4 SEDIMENT SAMPLING LOCATIONS AND RATIONALE
5 WASTE SAMPLING LOCATIONS AND RATIONALE
6 QUALITY ASSURANCE/QUALITY CONTROL SAMPLES
7 ANALYTICAL METHODOLOGY, REQUIRED SAMPLE CONTAINERS, AND PRESERVATIVES

TABLE 1
SMOKEY MOUTAIN SMELTERS
SOIL SAMPLING LOCATIONS AND RATIONALE

Station ID	Sample ID	Sample Type	Depth[1] (feet bgs)	Sample Analysis	Sample Container	Location	Rationale
SMS01	SMS-01-SF	Grab	0 to 2	VOCs	Three Encore samplers	Background, outside the influence of the SMS property. Exact location to be identified during sampling investigation.	Background surface soil sample for comparison to soil sample results
				SVOCs Pesticides PCBs	One 8-ounce jar		
				Metals Cyanide	One 8-ounce jar		
SMS01	SMS-01-SB	Grab	TBD	VOCs	Three Encore samplers	Background, outside the influence of the SMS property. Exact location to be identified during sampling investigation.	Background subsurface soil sample for comparison to subsurface waste samples
				SVOCs Pesticides PCBs	One 8-ounce jar		
				Metals Cyanide	One 8-ounce jar		
SMS02	SMS-02-SF	Grab	0 to 2	VOCs	Three Encore samplers	Apartment complex property	Determine presence or absence of hazardous substances
				SVOCs Pesticides PCBs	One 8-ounce jar		
				Metals Cyanide	One 8-ounce jar		
SMS03	SMS-03-SF	Grab	0 to 2	VOCs	Three Encore samplers	Apartment complex property	Determine presence or absence of hazardous substances
				SVOCs Pesticides PCBs	One 8-ounce jar		
				Metals Cyanide	One 8-ounce jar		

TABLE 1
SMOKEY MOUTAIN SMELTERS
SOIL SAMPLING LOCATIONS AND RATIONALE

Station ID	Sample ID	Sample Type	Depth[1] (feet bgs)	Sample Analysis	Sample Container	Location	Rationale
SMS04	SMS-04-SF	Grab	0 to 2	VOCs	Three Encore samplers	Apartment complex property	Determine presence or absence of hazardous substances
				SVOCs Pesticides PCBs	One 8-ounce jar		
				Metals Cyanide	One 8-ounce jar		

Notes:

[1] = The exact depth of sample collection will be determined in the field. The surface soil sample will not be collected from a depth greater than 2 feet below ground surface.
bgs = Below ground surface
ID = Identification
PCBs = Polychlorinated biphenyls
SF = Surface soil
SMS = Smokey Mountain Smelters
SVOCs = Semivolatile organic compounds
TBD = To be determined
VOCs = Volatile organic compounds

TABLE 2
SMOKEY MOUNTAIN SMELTERS
RESIDENTIAL WELL SAMPLING LOCATIONS AND RATIONALE

Station ID	Sample ID	Sample Type	Sample Analysis	Sample Container	Location	Rationale
SMS##PW	SMS-##-PW	Grab	VOCs	Three 40-mL vials	Upgradient background location to be determined in the field.	Background ground water sample for comparison to downgradient ground water sample results
			SVOCs Pesticides PCBs	Four 1-L ambers		
			Chloride	One 1-L polyethylene bottle		
SMS##PW	SMS-##-PW	Grab	VOCs	Three 40-mL vials	Up to 14 downgradient domestic well locations provided by EPA.	Determine whether past site activities or continued releases are impacted drinking water sources
			SVOCs Pesticides PCBs	Four 1-L ambers		
			Chloride	One 1-L polyethylene bottle		

Notes:

##	=	The domestic well sample will be given a unique number in the field.
EPA	=	U.S. Environmental Protection Agency
ID	=	Identification
L	=	Liter
mL	=	Milliliter
PCBs	=	Polychlorinated biphenyls
PW	=	Potable well
SMS	=	Smokey Mountain Smelters
SVOCs	=	Semivolatile organic compounds
VOCs	=	Volatile organic compounds

TABLE 3
SMOKEY MOUNTAIN SMELTERS
SURFACE WATER SAMPLING LOCATIONS AND RATIONALE

Station ID	Sample ID	Sample Type	Sample Analysis	Sample Container	Location	Rationale
SMS05	SMS-01-SW	Grab	SVOCs Pesticides PCBs	Four 1-L ambers	East Branch of Flenniken Branch, north and upgradient of SMS	Background surface water sample for comparison to downgradient surface water sample results
			VOCs	Three 40 mL vials		
			Metals	One 1-L ploy		
			Cyanide	One 1-L ploy		
SMS06	SMS-02-SW	Grab	SVOCs Pesticides PCBs	Four 1-L ambers	East Branch of Flenniken Branch at the location of where the leachate seep discharges into the creek	Determine presence or absence of hazardous substances
			VOCs	Three 40 mL vials		
			Metals	One 1-L ploy		
			Cyanide	One 1-L ploy		
SMS07	SMS-03-SW	Grab	SVOCs Pesticides PCBs	Four 1-L ambers	East Branch of Flenniken Branch, 20 feet downstream of the point where the leachate discharges into the creek	Determine presence or absence of hazardous substances
			VOCs	Three 40 mL vials		
			Metals	One 1-L ploy		
			Cyanide	One 1-L ploy		

Notes:

ID = Identification
L = Liter
mL = Milliliter
PCBs = Polychlorinated biphenyls
SMS = Smokey Mountain Smelters
SVOCs = Semivolatile organic compounds
SW = Surface water
VOCs = Volatile organic compounds

TABLE 4
SMOKEY MOUTAIN SMELTERS
SEDIMENT SAMPLING LOCATIONS AND RATIONALE

Station ID	Sample ID	Sample Type	Depth (inches bgs)	Sample Analysis	Sample Container	Location	Rationale
SMS05	SMS-01-SD	Grab	0 to 3	VOCs	Three Encore samplers	East Branch of Flenniken Branch, north and upgradient of SMS	Background sediment sample for comparison to downgradient sediment results
				SVOCs Pesticides PCBs	One 8-ounce jar		
				Metals Cyanide	One 8-ounce jar		
SMS06	SMS-02-SD	Grab	0 to 3	VOCs	Three Encore samplers	East Branch of Flenniken Branch at the location of where the leachate seep discharges into the creek	Determine presence or absence of hazardous substances
				SVOCs Pesticides PCBs	One 8-ounce jar		
				Metals Cyanide	One 8-ounce jar		
SMS07	SMS-03-SD	Grab	0 to 3	VOCs	Three Encore samplers	East Branch of Flenniken Branch, 20 feet downstream of the point where the leachate discharges into the creek	Determine presence or absence of hazardous substances
				SVOCs Pesticides PCBs	One 8-ounce jar		
				Metals Cyanide	One 8-ounce jar		

Notes:

bgs = Below ground surface
ID = Identification
PCBs = Polychlorinated biphenyls
SD = Sediment
SMS = Smokey Mountain Smelters
SVOCs = Semivolatile organic compounds
VOCs = Volatile organic compounds

TABLE 5
SMOKEY MOUNTAIN SMELTERS
WASTE SAMPLING LOCATIONS AND RATIONALE

Station ID	Sample ID	Sample Type	Depth[1] (feet bgs)	Sample Analysis	Sample Container	Location	Rationale
SMS08	SMS-01-WA	Grab	TBD	VOCs	Three Encore samplers	Salt cake waste pile, REAC former location SB-8	Determine presence or absence of hazardous substances
				SVOCs Pesticides PCBs	One 8-ounce jar		
				Metals Cyanide	One 8-ounce jar		
SMS09	SMS-02-WA	Grab	TBD	VOCs	Three Encore samplers	Salt cake waste pile, REAC former location SB-7	Determine presence or absence of hazardous substances
				SVOCs Pesticides PCBs	One 8-ounce jar		
				Metals Cyanide	One 8-ounce jar		
SMS10	SMS-03-WA	Grab	TBD	VOCs	Three Encore samplers	Salt cake waste pile, REAC former location SB-21	Determine presence or absence of hazardous substances
				SVOCs Pesticides PCBs	One 8-ounce jar		
				Metals Cyanide	One 8-ounce jar		
SMS11	SMS-04-WA	Grab	Surface	VOCs	Three Encore samplers	Aqueous, leachate seep emanating from the salt cake waste pile	Determine presence or absence of hazardous substances
				SVOCs Pesticides PCBs	One 8-ounce jar		
				Metals Cyanide	One 8-ounce jar		

TABLE 5
SMOKEY MOUNTAIN SMELTERS
WASTE SAMPLING LOCATIONS AND RATIONALE

Station ID	Sample ID	Sample Type	Depth[1] (feet bgs)	Sample Analysis	Sample Container	Location	Rationale
SMS12	SMS-05-WA	Grab	0 to 2	VOCs	Three Encore samplers	Aluminum dross waste sample from waste piles in the process building	Determine presence or absence of hazardous substances
				SVOCs Pesticides PCBs	One 8-ounce jar		
				Metals Cyanide	One 8-ounce jar		
SMS13	SMS-06-WA	Grab	0 to 2	VOCs	Three Encore samplers	Aluminum dross waste sample from waste piles in the process building	Determine presence or absence of hazardous substances
				SVOCs Pesticides PCBs	One 8-ounce jar		
				Metals Cyanide	One 8-ounce jar		
SMS14	SMS-07-WA	Grab	0 to 2	VOCs	Three Encore samplers	Aluminum dross waste sample from waste piles in the process building	Determine presence or absence of hazardous substances
				SVOCs Pesticides PCBs	One 8-ounce jar		
				Metals Cyanide	One 8-ounce jar		

Notes:
[1] = The depth of sample collection from the salt cake waste pile where soil borings were advanced by REAC will be determined in the field and will be selected based on the presence of waste in the sample. The former soil borings locations (SB-7, SB-8, and SB-21) for waste samples 1 through 3 are the locations where REAC collected samples in 2006 (Ref. 9).
bgs = Below ground surface
ID = Identification
PCBs = Polychlorinated biphenyls
REAC = Response Engineering and Analytical Contract
SMS = Smokey Mountain Smelters
SVOCs = Semivolatile organic compounds
VOCs = Volatile organic compounds
WA = Waste sample

TABLE 6
SMOKEY MOUNTAIN SMELTERS
QUALITY ASSURANCE/QUALITY CONTROL SAMPLES

Sample Number	Sample Type	Rationale
SMS-TS-01	Trip blank soil	Determine if unknown site conditions or sample handling procedures are influencing analytical results. One soil blank will be submitted with each sample shipment for VOC analysis.
SMS-TW-01	Trip blank water	Determine the existence and magnitude of contamination resulting from laboratory or field activities. One water trip blank will be submitted with each sample shipment for VOC analysis.
SMS-EB-01	Equipment rinsate blank	Determine if decontamination procedures adequately clean equipment. One equipment rinsate blank for the stainless steel equipment will be collected for each week of sampling activities.
SMS-PB-01	Preservative blank	Determine if preservatives or sample handling procedures are influencing analytical results. One preservative blank will be collected for each type of sample preservative used during the sampling event.
SMS-MB-01	Metals blank	Determine if unknown site conditions or sample handling are influencing analytical results. One metals blank provided by the EPA Region 4 SESD will be submitted for the sampling event.
SMS-##-XX	MS/MSD (Provided by SESD)	QA/QC sample to provide information about the effect of each sample matrix on the sample preparation procedures and measurement methodology. One MS/MSD sample will be designated for every 20 soil and water samples collected and will be included in each sample shipment.
SMS-##-XX-DUP	Field duplicates	Measure both field and laboratory precision. One duplicate sample will be collected for every 20 soil and water samples collected and will be included in each sample shipment.

TABLE 6
SMOKEY MOUNTAIN SMELTERS
QUALITY ASSURANCE/QUALITY CONTROL SAMPLES

Notes:

##	=	Sample number to be assigned in the field
DUP	=	Duplicate
EPA	=	U.S. Environmental Protection Agency
MB	=	Metals blank
MS/MSD	=	Matrix spike/matrix spike duplicate
PB	=	Preservative blank
QA/QC	=	Quality assurance/quality control
RB	=	Rinsate blank
SESD	=	U.S. Environmental Protection Agency Science and Ecosystem Support Division
SMS	=	Smokey Mountain Smelters
TS	=	Trip blank soil
TW	=	Trip blank water
XX	=	Sample media designation

TABLE 7
SMOKEY MOUTNAIN SMELTERS
ANALYTICAL METHODOLOGY, REQUIRED SAMPLE CONTAINERS, AND PRESERVATIVES

ANALYTICAL PARAMETER	PARAMETER: TO BE NOTED ON CHAIN-OF-CUSTODY RECORDS	MATRIX	ANALYTICAL METHOD	NUMBER[3] AND TYPE OF SAMPLE CONTAINER	PRESERVATION METHOD	SAMPLE HOLDING TIME
WASTE, SOIL, AND SEDIMENT SAMPLES						
Target Compound List (TCL)[1] volatile organic compounds (VOC)	VOCs	Waste, soil, or sediment	SOM01.2	Three Encore samples	Ice	Analyze all vials within 14 days of sample collection
TCL[1] semivolatile organic compounds (SVOC)	SVOCs	Soil or sediment	SOM01.2	One 8-ounce glass jar with Teflon®-lined lid	Cool to 4 °C	14 days to extraction; extracts must be analyzed within 40 days following extraction
TCL[1] Pesticides	Pest	Soil or Sediment	SOM01.2			
TCL[1] polychlorinated biphenyl compounds (PCB)	PCBs	Soil or sediment	SOM01.2			
Target Analyte List (TAL) [1] Metals and Cyanide	TM, Hg, CN	Soil or sediment	ILM05.4	One 8-ounce glass jar with Teflon®-lined lid	Cool to 4 °C	28 days for mercury and 6 months for all other metals; 14 days for cyanide
AQUEOUS[3] SAMPLES						
TCL[1] VOCs	VOCs	Aqueous[3]	SOM01.2	Three 40-mL glass vials with Teflon®-lined septum lids	Hydrochloric acid (HCl) to pH<2; cool to 4 °C	14 days
TCL[1] VOCs	VOCs	Aqueous[3] trip blank	SOM01.2	Three 40-mL glass vials with Teflon®-lined septum lids	HCl to pH<2; cool to 4 °C	14 days

TABLE 7
SMOKEY MOUTNAIN SMELTERS
ANALYTICAL METHODOLOGY, REQUIRED SAMPLE CONTAINERS, AND PRESERVATIVES

ANALYTICAL PARAMETER	PARAMETER: TO BE NOTED ON CHAIN-OF-CUSTODY RECORDS	MATRIX	ANALYTICAL METHOD	NUMBER[3] AND TYPE OF SAMPLE CONTAINER	PRESERVATION METHOD	SAMPLE HOLDING TIME
TCL[1] SVOCs	SVOCs	Aqueous[3]	SOM01.2	Two 1-liter amber glass bottles with Teflon®-lined lids	Cool to 4 °C	7 days to extraction; extracts must be analyzed within 40 days following extraction
TCL[1] Pesticides	Pest	Aqueous[3]	SOM01.2	Two 1-liter amber glass bottles with Teflon-lined lids	Cool to 4 °C	7 days to extraction; extracts must be analyzed within 40 days after extraction
TCL[1] PCBs	PCBs	Aqueous[3]	SOM01.2			
TAL[1] Metals	TM, Hg	Aqueous[3]	ILM05.4	One 1-liter polyethylene bottle	Nitric acid (HNO_3) to pH<2; cool to 4 °C	28 days for mercury and 6 months for all other metals
Cyanide[1], Total	CN	Aqueous[3]	ILM05.4	One 1-liter polyethylene bottle	Sodium hydroxide (NaOH) to pH≥12; cool to 4 °C	14 days
Chloride	Chloride	Aqueous[3]	300.0	One 1-liter polyethylene bottle	Cool to 4 °C	28 days

TABLE 7
SMOKEY MOUTNAIN SMELTERS
ANALYTICAL METHODOLOGY, REQUIRED SAMPLE CONTAINERS, AND PRESERVATIVES

Notes:

[1] = CLP SOW ILM05.4 can be viewed at the following website: http://www.epa.gov/superfund/programs/clp/ilm5.htm.
[2] = Aqueous samples may include surface water samples, leachate sample, domestic well samples, field blanks, and equipment rinsate blanks.
[3] = For aqueous samples designated for matrix spike and matrix spike duplicate (MS/MSD) analysis, triple volumes of sample will need to be collected. For soil and sediment samples designated for MS/MSD analysis, no additional sample volume is needed for TAL metals and cyanide.
°C = Degrees Celsius
< = Less than
≥ = Greater than or equal to
CLP = Environmental Protection Agency Contract Laboratory Program
CN = Cyanide
Hg = Mercury
ILM = Multi-media, multi-concentration inorganic analysis ILM 05.4.
PCBs = Polychlorinated biphenyls
Pest = Pesticides
SOW = Statement of work
SVOCs = Semi-volatile organic compounds
TAL = Target analyte list
TCL = Target compound list
TM = Total metals
VOCs = Volatile organic compounds

APPENDIX C

SITE-SPECIFIC QUALITY ASSURANCE PROJECT PLAN

(16 Pages)

FINAL
SITE-SPECIFIC QUALITY ASSURANCE PROJECT PLAN (SHORT FORM)

SMOKEY MOUNTAIN SMELTERS
KNOXVILLE, KNOX COUNTY, TENNESSEE

Revision 1

Prepared for

U.S. ENVIRONMENTAL PROTECTION AGENCY
Region 4
Atlanta, GA 30303

Contract No.	:	EP-W-05-054
TDD No.	:	TTEMI-05-003-0001
Date Prepared	:	April 22, 2009
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Prepared by	Reviewed by	Approved by
Alicia Shultz	Shanna Davis	Andrew F. Johnson
START III Site Manager	START III Technical Reviewer	START III Program Manager

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QUALITY ASSURANCE PROJECT PLAN (SHORT FORM)
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION 4 & TETRA TECH, INC.
SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM CONTRACT NO. EP-W-05-054

Site Name:	Smokey Mountain Smelters (SMS)	**City, County:** Knoxville, Knox County	**State:** Tennessee
Prepared By:	Tetra Tech, Inc. (Tetra Tech)	**Date:** April 22, 2009	
Approved By:	Sandra Harrigan **Date:** 04/22/09	**Signature:**	
Title:	Tetra Tech Project Manager		
Approved By:	Jessica Vickers **Date:** 04/22/09	**Signature:**	
Title:	Tetra Tech Quality Assurance Manager		
Approved By:	Andrew Johnson **Date:** 04/22/09	**Signature:**	
Title:	Tetra Tech START III Program Manager		
Approved By:	John Nolen **Date:**	**Signature:**	
Title:	EPA Remedial Project Manager and EPA Region 4 QA Manager's Designated Approving Official (DAO)		

1.0 PROJECT INFORMATION

1.1 Distribution List:

EPA Region 4:

John Nolen, EPA Remedial Project Manager
Matthew Huyser, EPA On-Scene Coordinator
Don Bussey, EPA Response Engineering and Analytical Contract (REAC) Work Assignment Manager
Katrina Jones, EPA Project Officer
Darryl Walker, EPA Alternate Project Officer

Angel Reed, Tetra Tech Document Control Coordinator

Kenneth D. Woodruff, REAC

Tennessee Department of Environmental Conservation (TDEC)

1.2 Project/Task Organization

Matthew Huyser will serve as the U.S. Environmental Protection Agency (EPA) On-Scene Coordinator (OSC) for removal assessment activities and John Nolen will serve as the EPA Remedial Project Manager for site assessment activities described in this Quality Assurance Project Plan (QAPP). Alicia Shultz of Tetra Tech EM Inc. (Tetra Tech) will serve as the Tetra Tech site manager and is responsible for maintaining an approved version of this QAPP. Jessica Vickers of Tetra Tech will serve as the Tetra Tech quality assurance manager and is responsible for providing Tetra Tech approval of this QAPP. Specific Tetra Tech field personnel will be determined before mobilization, including a junior scientist as defined under the Superfund Technical Assessment and Response Team (START) Contract No. EP-W-05-054.

1.3 Problem Definition/Background:

☐ Description attached.

☒ Description in referenced reports:

Title	Date
Final SAP Sampling and Analysis Plan (SAP)	April 22, 2009

1.4 Project/Task Description:

☐ Description attached.

☒ Description in referenced reports:

Title	Date
Final SAP	April 22, 2009
Health and Safety Plan	April 22, 2009

Schedule: The field sampling event is scheduled to occur the week of April 27, 2009.

1.5 Quality Objectives and Criteria for Measurement Data:

Identification of the seven steps of the data quality objectives (DQO) process: DQOs were established for the Smokey Mountain Smelters (SMS) site to define the quantity and quality of the data to be collected to support the objectives of the SAP. DQOs were developed using the seven-step process outlined in the following EPA guidance documents: "EPA Requirements for Quality Assurance Project Plans," EPA QA/R-5, March 2001; "Guidance for Quality Assurance Project Plans," EPA QA/G-5; and "Guidance on Systematic Planning Using the Data Quality Objectives Process," EPA QA/G-4, February 2006.

Step 1: State the Problem

Stakeholders: EPA, TDEC, local community

Site History/Conceptual Site Model: The SMS site is the former location of an agricultural chemical manufacturer and aluminum smelter. From 1922 to 1979 an agricultural chemical manufacturing company operated on the SMS property. The SMS property was established in 1979 and operated an aluminum smelter. SMS received violations related to open burning and excessive emissions. A landfill (Witherspoon and Johnson Dump) operated on the southern portion of the SMS property. Demolition and industrial wastes were disposed of in the landfill. Industrial waste included "salt cake" which resulted from the processing of aluminum ore. The following wastes were observed on SMS: baghouse dust; dross; slag; large blocks of materials resembling spent anode or cathode materials from primary aluminum production; a suspected mixture of baghouse dust and dross/slag from secondary aluminum smelting; casting wastes, anode/cathode wastes; and dross/slag from primary aluminum production. The Aluminum Company of America (Aloca) sent large quantities of wastes potentially containing hazardous substances to the SMS Knoxville facility between 1985 and 1992. The wastes included dross, filters, furnace bottoms, oily scalper chips, tabular balls, salt cake, and pot pads. A large waste pile used for the disposal of smelting wastes (salt cake), at the same location of the landfill is located on the southern portion of the property. The salt cake waste pile contains metals, pesticides, and polynuclear aromatic hydrocarbons (PAH). A leachate seep from the salt cake waste pile contains metals.

TDEC and Response Engineering and Analytical Contract (REAC) personnel collected waste samples from an on-site salt cake waste pile, leachate, and surface water. The samples document the presence of metals in the wastes and in surface water.

Statement of Problem: Sampling and laboratory analysis will be required to adequately document the presence of hazardous substances in the salt cake waste pile, leachate seep, and receiving surface water bodies. Additionally, soil samples are needed from the apartment complex adjacent to the site to determine if hazardous substances related to smelter operations were released to residential soil surrounding the complex. Potable well samples need to be collected and analyzed to determine if hazardous substances from the SMS site released to ground water. Waste samples will be collected for reactivity/treatability testing.

Step 2: **Identify the Goals of the Study**	**Study Questions:** Are contaminants present on the property at concentrations exceeding comparison criteria? **Decision Statements:** Evaluate analytical data for environmental samples to determine whether (1) contaminant concentrations are present above sample-specific minimum reporting limits, (2) contaminants exceed comparison criteria and background concentrations, and (3) contaminant releases have occurred.
Step 3: **Identify Information Inputs**	**Inputs:** Site history contained in Section 2.0 of the final SAP dated April 22, 2009.
Step 4: **Define Study Boundaries**	**Spatial Boundary:** The SMS site is defined as the salt cake waste pile, leachate seep, buildings, and aluminum dross wastes in on-site buildings and any other areas where hazardous substances may be located due to the migration of hazardous substances from the salt cake or aluminum dross waste piles and operations of the smelter and agricultural chemical manufacturing facility. Site-related contaminants have been detected in the East Branch of Flenniken Branch. **Temporal Boundaries:** Sampling activities are scheduled for the week of April 27, 2009. The temporal boundaries for sampling activities extend from when EPA initiates activities until EPA declares activities complete.
Step 5: **Develop the Analytical Approach**	**Analytical Methods:** The analytical parameters and associated laboratory analytical methods that will be used for this project are listed below. • EPA Contract Laboratory Program (CLP) Statement of Work for Organics Analysis (SOM01.2), Multi-Media, Multi-Concentration • EPA CLP Statement of Work (SOW) for Inorganic Analysis (ILM05.4) Analysis, Multi-Media, Multi-Concentration • EPA Region 4 SESD Analytical Support Branch (ASB) Method 300.0 for Chloride **Comparison Criteria:** Analytical data results will be compared to the comparison criteria listed below. • EPA Superfund Chemical Data Matrix (SCDM) benchmarks for Hazard Ranking System (HRS) scoring: http://www.epa.gov/superfund/sites/npl/hrsres/tools/scdm.htm • EPA Region 4 Sediment and Surface Water Screening Values: http://www.epa.gov/region4/waste/ots/ecolbul.htm • EPA Regional Soil Screening Levels: http://epa-prgs.ornl.gov/chemicals/index.shtml

Step 5 Continued: Develop the Analytical Approach	**Decision Rules:** Analytical results will be compared with background concentrations for all media sampled and to the comparison criteria listed above. Constituent concentrations in samples that are greater than or equal to three times the background concentration or are greater than or equal to the sample-specific and analyte-specific MRL in the background sample are considered elevated. Constituent concentrations that are greater than or equal to the HRS benchmarks in the EPA SCDM and are elevated and meet the observed release criteria will be evaluated as actual contamination if detected in samples collected at HRS target locations, including wetlands and fisheries, specified in the HRS rule. Analytical results will also be compared to ground water, surface water, sediment, and soil screening values.
Step 6: Specify Performance or Acceptance Criteria	Initial acceptance of the data will be determined by the EPA Region 4 SESD Office of Quality Assurance through the CLP data validation process. Any rejected data (and the reasons for their rejection) will be summarized in the data validation report. Additionally, Tetra Tech will evaluate the data using the HRS rule and guidance manual and the EPA fact sheet on using estimated data. Sample concentrations will be reviewed to ensure that concentrations were detected above the sample- and analyte-specific minimum reporting limits. See Table 2 of this QAPP.
Step 7: Develop the Plan for Obtaining Data	**Optimized Design:** In all, 4 surface soil, up to 15 potable well ground water, 1 leachate, 3 surface water, and 3 sediment, and 6 waste samples are proposed for this event, not including duplicate and QA/QC samples. The types and number of environmental samples collected will be biased to identify source locations and to document observed releases of site-related contaminants to the ground water and surface water migration, and soil exposure pathways. The samples to be collected and their proposed locations are summarized in Appendix B of the final SAP, dated April 22, 2009.

1.6 Special Training/Certification Requirements:

☒ OSHA 29 CFR 1910.120 ☐ Special Equipment/Instrument Operator (describe below): ☐ Other (describe below):

Special Requirements:

Training, including record retention, will be conducted in accordance with Section H.2 of EPA START III Contract No. EP-W-05-054 as well as the Tetra Tech START Program Level QAPP dated February 2006 (Sections 1.5 and 1.6). Also, the Tetra Tech Director of Health and Safety maintains a database of personnel training located in the Tetra Tech Chicago, Illinois, corporate office.

1.7 Documentation and Records:

The most current version of this QAPP will be distributed to the entire distribution list presented in Section 1.1. The Tetra Tech site manager will be responsible for maintaining the most current revision of this QAPP and for distributing it to all personnel and parties involved in the field effort. Field records that may be generated include the following:

☒ Chains-of-Custody Forms	☒ Health and Safety Plan
☒ Field Instrument Calibration Logs	☒ Photographic Documentation Log
☒ Field Monitoring and Screening Results	☒ Site Logbook
☒ Soil Borings and/or Well Logs	☒ Site Maps and Drawings

Field documentation and records will be generated and maintained in accordance with the requirements presented in the following EPA Region 4 Science and Ecosystem Division (SESD) guidance document: *Field Branches Quality System and Technical Procedures*, February 2008. This document can be found at the following web address: http://www.epa.gov/region4/sesd/fbqstp/index.html

Laboratory analytical data will be generated and maintained in accordance with the EPA, CLP Statement of Work for Organic Analysis, Multi-Media, Multi-Concentration, SOM01.2, April 2007; and the SESD ASB Laboratory Operations and Quality Assurance Manual (LOQAM), January 2009. The web address is: http://www.epa.gov/superfund/programs/clp/som1.htm. EPA CLP SOW for Inorganic Analysis Multi-Media, Multi-Concentration, ILM05.4, December 2006. The web address is: http://www.epa.gov/superfund/programs/clp/dlm2.htm.

The formal deliverables for EPA associated with this project are specified in the EPA Technical Direction Document. Final and final reports will be prepared for each site to summarize field activities and findings and present laboratory analytical results. All project records under Tetra Tech' s control will be maintained and retained in accordance with the requirements of EPA START III Contract No. EP-W-05-054.

2.0 DATA GENERATION AND ACQUISITION

2.1 Sampling Process Design:

The final SAP, dated April 22, 2009, presents details on the types and numbers of samples to be collected, sampling locations, sample matrices, and laboratory analytical methods (see Sections 4.0, 5.0, 6.0, and Appendix B of the final SAP). The rationale for this sampling process design is based on the DQO process discussed in Section 1.5 of this QAPP. Samples submitted to the CLP and the SESD ASB will be analyzed for EPA target analyte list metals and cyanide, chlorides, and target compound list volatile organic compounds (VOC), semivolatile organic compounds (SVOC), pesticides, and polychlorinated biphenyls (PCB). In addition, residential wells will also be analyzed for chloride. Appendix B of the final SAP contains the analytical parameters for each sampling location.

2.2 Sample Methods Requirements:

Matrix	Sampling Method	EPA and Tetra Tech Standard Operating Procedures and Guidance
Soil and Sediment	Refer to Section 4.0 and Tables 1 and 4 of Appendix B of the final SAP, dated April 22, 2009 for more details, including requested laboratory analyses and methods.	Refer to the EPA Region 4, SESD Field Branches Quality System and Technical Procedures, February 2008. Available at the following web address: http://www.epa.gov/region4/sesd/fbqstp/index.html. Also refer to Section 2.2, page 20 of the Tetra Tech START Program Level QAPP dated February 2006. A list of applicable standard work practices (SWP) is included in the HASP, which will be available on site.
Surface Water and Ground Water (Residential Wells)	Refer to Section 4.0 and Tables 2 and 3 of Appendix B of the final SAP, dated April 22, 2009 for more details, including requested laboratory analyses and methods.	Refer to the EPA Region 4, SESD Field Branches Quality System and Technical Procedures, February 2008. Available at the following web address: http://www.epa.gov/region4/sesd/fbqstp/index.html. Also refer to Section 2.2, page 20 of the Tetra Tech START Program Level QAPP dated February 2006. A list of applicable SWPs is included in the HASP, which will be available on site.
Waste solid or aqueous (leachate)	Refer to Section 4.0 and Table 5 of Appendix B of the final SAP, dated April 22, 2009 for more details, including requested laboratory analyses and method	Refer to the EPA Region 4, SESD Field Branches Quality System and Technical Procedures, February 2008. Available at the following web address: http://www.epa.gov/region4/sesd/fbqstp/index.html. Also refer to Section 2.2, page 20 of the Tetra Tech START Program Level QAPP dated February 2006. A list of applicable SWPs is included in the HASP, which will be available on site.

Other Sample Method Requirements: The Tetra Tech site manager, in coordination with the EPA Remedial Project Manager, will be responsible for identifying failures in sampling and field measurement systems, overseeing any corrective actions, ensuring that the corrective actions are documented in site logbooks and other appropriate records, and assessing the effectiveness of corrective actions. Field decontamination will be conducted in accordance with the procedures provided in the EPA Region 4, SESD Field Branches Quality System and Technical Procedures, February 2008. Available at the following web address: http://www.epa.gov/region4/sesd/fbqstp/index.html. Equipment required for this sampling event includes disposable Nitrile gloves, latex boot covers, sample jars, sample packaging materials such as coolers and vermiculite or suitable packing material, and personal protective equipment (PPE) identified in the health and safety plan (HASP). Also see Table 3 of this QAPP for a list of equipment and supplies. REAC will be providing the sampling equipment, including sampling jars.

2.3 Sample Handling and Custody Requirements:

Sample handling and chain-of-custody record keeping will be conducted in accordance with EPA Region 4 Field Branches Quality System and Technical Procedures requirements for processing and submitting samples to laboratories. Once collected, all samples will be placed on ice and kept in a custody-sealed cooler in a secure location. The Tetra Tech site manager will ensure that custody of samples is maintained until they are shipped to the laboratory. Chain-of-custody records will be used to document the samples collected and delivered to the laboratory. Samples will be processed using EPA Forms II Lite software. Sample handling, custody, and shipping procedures are also presented in the EPA Region 4, Field Branches Quality System and Technical Procedures, which is available at the following web address: http://www.epa.gov/region4/sesd/fbqstp/index.html.

Also refer to Section 2.3, page 28 of the Tetra Tech START Program Level QAPP dated February 2006.

2.4 Analytical Method Requirements:

The analytical parameters and associated laboratory analytical methods that will be used for this project are listed below and are presented in Section 6.0 of the final SAP, dated April 22, 2009, and Table 2 of this QAPP. Analytical methods will be selected by the EPA Sample Management Office (SMO), SESD Office of Quality Assurance, or in accordance with Section 2.4, page 31 of the Tetra Tech START Program Level QAPP dated February 2006. The analytical methods will also be provided on the laboratory assignment sheet received from the EPA SMO.

- EPA CLP SOW for Organics Analysis (SOM01.2), Multi-Media, Multi-Concentration
- EPA CLP SOW for Inorganic Analysis (ILM05.4), Multi-Media, Multi-Concentration
- EPA Region 4, SESD ASB, LOQAM Method 300.0 for Chloride

Data validation of the CLP and SESD Analytical Support Branch analytical data packages will be conducted by the Office of Quality Assurance. Data validation will be conducted in accordance with the EPA CLP SOW for Organics (SOM01.2) and Inorganic (ILM05.4) Analysis, Multi-Media, Multi-Concentration; the EPA National Functional Guidelines for Superfund Organic Methods Data Review, EPA540/R-07/003, June 2008; the EPA National Functional Guidelines for Inorganic Data Review, EPA540-R-04/004, October 2004; EPA Region 4 SESD Data Validation Standard Operating Procedures for Organic Analysis, Revision 3.1, August 2008; and Section 2.5.2, page 35 of the Tetra Tech START Program Level QAPP dated February 2006. Laboratory instruments required for sample analyses are contained in the CLP SOWs and the EPA Region 4 SESD ASB LOQAM.

Modifications to data validation criteria will be provided by EPA. Individuals responsible for ensuring the success of the analyses include Jenny Scifres, EPA SESD, Chief of the Inorganic Chemistry Section; Sallie Hale, EPA SESD, Chief of the Organic Chemistry Section; and Cindy Gurley, EPA Region 4 CLP Project Officer.

A 21-day turnaround time was requested for the laboratory to submit results to the EPA SESD, Office of Quality Assurance. Tetra Tech anticipates the final validated CLP and SESD data packages will be received from SESD within 42 days. Within 14 business days after the packages are received, Tetra Tech will conduct a cursory review of the data packages against the chain-of-custody records to ensure that results for all samples are received. The data packages will also be reviewed to determine whether any data are rejected and whether any data qualifiers assigned during the validation process affects the usability of the data as defined in Section 1.5 of this QAPP. Once the cursory review is completed, Tetra Tech will notify the Remedial Project Manager of problems encountered, if any. Tetra Tech will submit the final reports to EPA within 40 business days after the final validated CLP and SESD data packages have been received.

2.5 Quality Control Requirements:

Quality control requirements for field monitoring are provided in the EPA Region 4, SESD Field Branches Quality System and Technical Procedures, which is available at the following web address: http://www.epa.gov/region4/sesd/fbqstp/index.html as well as in Section 2.5.1, page 34 of the Tetra Tech START Program Level QAPP dated February 2006.

Quality control requirements for analytical methods are presented in the associated EPA CLP SOW for Organic (SOM01.2) and Inorganic (ILM05.4) Analysis, Multi-Media, Multi-Concentration; the EPA Region 4 SESD ASB LOQAM; the EPA National Functional Guidelines for Superfund Organic Methods Data Review, EPA540/R-07/003, June 2008; and the EPA National Functional Guidelines for Inorganic Data Review, EPA540-R-04/004, October 2004; as well as in Section 2.5.2, page 35 of the Tetra Tech START Program Level QAPP dated February 2006.

Laboratory and quality control samples will include one matrix spike and matrix spike duplicate (MS/MSD) from sample sets collected at a frequency of one MS/MSD sample for every 20 samples per medium collected. Field quality control samples will include field duplicate samples collected at a frequency of one field duplicate sample for every 20 samples per medium collected; at least two equipment rinsate blanks; as well as preservative and trip blanks. One of the equipment rinsate blanks will be collected from an aluminum pan to ensure aluminum will not affect the sample results. A blind metals blank also will be provided by the EPA Region 4 SESD to determine if unknown site conditions or sample handling are influencing analytical results. Additional laboratory quality control samples, including performance evaluation samples, will be submitted directly to the laboratory by EPA. All quality control samples will be submitted for analysis of parameters listed in Table 2 of this QAPP and in Table 6 in Appendix B of the final SAP dated April 22, 2009.

2.6 Instrument/Equipment Testing, Inspection, and Maintenance Requirements:

For instrument testing, inspection, and maintenance requirements for field monitoring, refer to the EPA Region 4, SESD Field Branches Quality System and Technical Procedures, which is available at the following web address: http://www.epa.gov/region4/sesd/fbqstp/index.html. Also refer to the manufacturer's operating manual for further instructions on field instrument testing, inspection, and maintenance as well as to Section 2.6, pages 40 and 41 of the Tetra Tech START Program Level QAPP dated February 2006. Table 3 of this QAPP contains a list of field instruments that will be used during this sampling event.

Laboratory instrument testing, inspection, and maintenance requirements are contained in the CLP SOWs as well as in the associated manufacturer's operating manuals.

2.7 Instrument Calibration and Frequency:

For instrument calibration and frequency requirements for field monitoring, refer to the EPA Region 4, SESD Field Branches Quality System and Technical Procedures, which is available at the following web address: http://www.epa.gov/region4/sesd/fbqstp/index.html. Also refer to the manufacturer's operating manual for further instructions on calibration as well as to Section 2.7, page 42 of the Tetra Tech START Program Level QAPP dated February 2006.

Instrument calibration and frequency requirements for EPA analytical methods are presented in the EPA CLP SOW for Organic (SOM01.2) and Inorganic (ILM05.4) Analysis, Multi-Media, Multi-Concentration; the EPA Region 4 SESD ASB LOQAM; the EPA National Functional Guidelines for Superfund Organic Methods Data Review, EPA540/R-07/003, June 2008; and the EPA National Functional Guidelines for Inorganic Data Review, EPA540-R-04/004, October 2004; as well as in the associated manufacturer's operating manuals, the laboratory QA manual, as well as in Section 2.8, page 43 of the Tetra Tech START Program Level QAPP dated February 2006.

2.8 Inspection/Acceptance Requirements for Supplies and Consumables:

Supplies and consumables required for this sampling event will be inspected and accepted by the Tetra Tech site manager or designated field team member and include disposable Nitrile gloves, latex boot covers, sample jars, sample packaging materials, and PPE identified in the HASP. All sample containers will meet EPA criteria for cleaning procedures for low-level chemical analysis. Sample containers will have certifications provided by the manufacturer in accordance with pre-cleaning criteria established by EPA. See Section 2.8, page 44 of the Tetra Tech START Program Level QAPP dated February 2006. See Table 3 in this QAPP for a complete list of supplies and consumables.

2.9 Non-Direct Measurement Requirements:

Information pertaining to the site (including photographs, maps, and so forth) has been compiled from file information obtained from EPA. Some of that data and information are presented in the final SAP, dated April 22, 2009. The extent to which this data and information, if any, are used to achieve the objectives of this project will be determined by Tetra Tech in cooperation with the EPA Remedial Project Manager. Any justifications and qualifications required for the use of this data and information will be provided in the reports generated for this project. Refer to Section 2.9, page 44 of the Tetra Tech START Program Level QAPP dated February 2006. Historical information, including target data obtained from internet websites, will be reviewed and cross referenced with information obtained from EPA and TDEC for accuracy prior to inclusion in the investigation reports.

2.10 Data Management:

All reference materials generated during this investigation and included in the final reports will be submitted to the Remedial Project Manager in PDF on CD. All field-generated data will be managed as part of the permanent field record for the project. All laboratory analytical data will be managed in accordance with the requirements of the CLP SOW for Organic (SOM01.2) and Inorganic (ILM05.4) Analysis, Multi-Media, Multi-Concentration; the EPA Region 4 SESD ASB LOQAM; EPA National Functional Guidelines for Superfund Organic Methods Data Review, EPA540/R-07/003, June 2008; and the EPA National Functional Guidelines for Inorganic Data Review, EPA540-R-04/004, October 2004; as well as the EPA Region 4 policy and applicable federal regulations. Finally, all field-generated data and other records generated or obtained during this project will be managed according to the requirements of EPA START III Contract No. EP-W-05-054 as well as to Section 2.10, page 45 of the Tetra Tech START Program Level QAPP dated February 2006.

3.0 ASSESSMENT AND OVERSIGHT

3.1 Assessment and Response Actions:

Field and laboratory audits will not be conducted for this project. All deliverables that Tetra Tech contributes to in whole or in part, including the final reports, will be subjected to the corporate three-tiered review process, which includes a technical review, an editorial review, and a quality control review, with each reviewer signing off on a quality control review sheet when any issues or revisions have been addressed. These reviews will be performed by qualified individuals in accordance with the requirements of EPA START III Contract No. EP-W-05-054 and with Section 3.1, page 46 of the Tetra Tech START Program Level QAPP dated February 2006.

3.1A Corrective Action:

The Tetra Tech site manager, in coordination with the EPA Remedial Project Manager, will be responsible for identifying failures in sampling and field measurement systems, overseeing any corrective actions, ensuring that the corrective actions are documented in site logbooks and other appropriate records, and assessing the effectiveness of corrective actions. Corrective action requirements for EPA analytical methods are presented in the CLP SOW for Organic (SOM01.2) and Inorganic (ILM05.4) Analysis, Multi-Media, Multi-Concentration; the EPA Region 4 SESD ASB LOQAM; the EPA National Functional Guidelines for Superfund Organic Methods Data Review, EPA540/R-07/003, June 2008; the EPA National Functional Guidelines for Inorganic Data Review, EPA540-R-04/004, October 2004; and Section 3.1.2, page 48 of the Tetra Tech START Program Level QAPP dated February 2006.

3.2 Reports to Management:

All formal deliverables to EPA associated with this project will be prepared, reviewed, and distributed in accordance with the requirements of the EPA START III Contract No. EP-W-05-054, Section 3.2, page 50 of the Tetra Tech START Program Level QAPP dated February 2006, and under the supervision of the Tetra Tech Quality Assurance Manager, Jessica Vickers or appropriate designee.

4.0 DATA VALIDATION AND USABILITY

4.1 Data Review, Verification, and Validation Requirements:

All field-generated data and records (such as global positioning system coordinates of sampling locations and field logbook notes) will be reviewed for completeness and accuracy by the Tetra Tech site manager and appropriate designees. Field data and records will be reviewed at the end of each day so that corrective actions, if necessary, can be made prior to demobilizing from the site.

The CLP analytical data packages will be validated by the EPA Region 4 SESD, Office of Quality Assurance. Data validation will be conducted in accordance with the EPA CLP SOW for Organic (SOM01.2) and Inorganic (ILM05.4) Analysis, Multi-Media, Multi-Concentration; the EPA Region 4 SESD ASB LOQAM; the EPA National Functional Guidelines for Superfund Organic Methods Data Review, EPA540/R-07/003, June 2008; the EPA National Functional Guidelines for Inorganic Data Review, EPA540-R-04/004, October 2004; EPA Region 4 SESD Data Validation Standard Operating Procedures for CLP Routine Analytical Services, Revision 2.1, July 1999.

Modifications to data validation criteria will be provided by the EPA. Individuals responsible for ensuring the success of the analyses conducted by the CLP laboratories include Jenny Scifres, EPA SESD, Chief of the Inorganic Chemistry Section; Sallie Hale, EPA SESD, Chief of the Organic Chemistry Section; and Cindy Gurley, EPA Region 4 CLP Project Officer.

Also see Section 4.1, page 52 of the Tetra Tech START Program Level QAPP dated February 2006.

4.2 Verification and Validation Methods:

All field-generated data will be maintained in the project file and included (as appropriate) in project deliverables in final form after all reviews and associated corrective actions are performed. The laboratory analytical data will be validated in accordance with EPA policy, by the EPA Region 4 SESD, Office of Quality Assurance. The analytical data validation methods are provided in the EPA National Functional Guidelines for Superfund Organic Methods Data Review, EPA540/R-07/003, June 2008; the EPA National Functional Guidelines for Inorganic Data Review, EPA540-R-04/004, October 2004; the EPA Region 4 SESD Data Validation Standard Operating Procedures for CLP Routine Analytical Services, Revision 2.1, July 1999; and Section 4.1, page 52 of the Tetra Tech START Program Level QAPP dated February 2006. The validated CLP analytical data packages will contain a summary of all data qualifier flags and their explanations.

Also see Section 4.2, page 53 of the Tetra Tech START Program Level QAPP dated February 2006.

4.3 Reconciliation of the Data to the Project-Specific DQOs:

The Tetra Tech site manager, in cooperation with the EPA Remedial Project Manager and Tetra Tech QA Manager, will be responsible for reconciling the data and other project results with the requirements specified in this QAPP and by the data users and decision makers. Ultimate acceptance of the data is at the discretion of the EPA Remedial Project Manager. Depending on the nature of how specific data quality indicators do not meet the project's requirements, the data may be discarded and resampling and reanalysis of the subject samples may be required. Resampling, reanalysis, or other out-of-scope actions identified to address data quality deficiencies and data gaps will require approval by the EPA Remedial Project Manager, EPA Project Officer, and EPA Contracting Officer.

All final CLP data packages will be reviewed to determine whether the site-specific DQOs, as defined in Section 1.5 of this QAPP, are met based on the following guidance documents:

- EPA, HRS, 40 Code of Federal Regulations Part 300, Appendix A, 55 Federal Register 51532. December 14, 1990.
- EPA, HRS Guidance Manual, Publication 9345.1-07, EPA 540-R-92-026. November 1992.
- EPA, Guidance for Performing Site Inspections Under CERCLA, Interim Final, Publication 9345.1-05.
- EPA, Using Qualified Data to Document an Observed Release and Observed Contamination. November 1996.
- EPA, Guidance on Systematic Planning using the Data Quality Objectives Process.

The data packages will also be reviewed to determine whether any data are rejected and whether any data qualifiers assigned during the validation process affect the usability of the data as defined in Section 1.5 of this QAPP. Estimated, or "J-" flagged, data will be evaluated in accordance with Using Qualified Data to Document an Observed Release and Observed Contamination fact sheet dated November 1996. This evaluation will be conducted to ensure that estimated results used to establish observed releases and areas of observed contamination meet the HRS definition of elevated concentrations. Data that are rejected will be identified in the CLP analytical data packages received from the EPA SESD Office of Quality Assurance. Reconciliation of the data to the project-specific DQOs will be conducted in accordance with EPA guidance documents including: the HRS rule and guidance manual, site inspection (SI) guidance, and Guidance on Systematic Planning using the Data Quality Objectives Process.

Also see Section 4.3, page 55 of the Tetra Tech START Program Level QAPP dated February 2006.

TABLE 1: SAMPLE SUMMARY

Site Names:	Smokey Mountain Smelters	**City, County:** Knoxville, Knox County	**State:** Tennessee

ENVIRONMENTAL SAMPLES

No. of Samples	Matrix	Location	Purpose	Depth or other Descriptor	Sampling Method	Requested Analyses	Analytical Methods
ALL MATRICES							
Refer to Section 3.0 and Appendices A and B of the final SAP, dated April 22, 2009 for proposed field sampling locations. Tetra Tech personnel, along with the EPA Remedial Project Manager and REAC personnel, will conduct a site reconnaissance to designate potential biased sampling locations and identify potential background sampling locations. Final sampling locations will be based on observations in the field.							
QUALITY CONTROL SAMPLES							
Refer to Table 6 in Appendix B of the final SAP, dated April 22, 2009 and to Section 2.5 of this QAPP.							

☒ Refer to the final SAP, dated April 22, 2009.

TABLE 2: PERFORMANCE OR ACCEPTANCE CRITERIA

Site Names: Smokey Mountain Smelters	**City, County:** Knoxville, Knox County	**State:** Tennessee

ALL MATRICES

Analysis	**Analytical Method***
TAL Metals, Mercury, and Cyanide	ILM05.4
TCL VOCs, SVOCs, Pesticides, and PCBs	SOM01.2
Chloride	EPA Region 4, SESD ASB, LOQAM Method 300.0

*The final analytical methods will be provided by the EPA Sample Management Office (SMO) on the laboratory assignment sheet.

Data Quality Measurements

Accuracy	Refer to EPA Region 4, SESD, Field Branches Quality System and Technical Procedures, the CLP SOWs, the EPA Region 4 SESD ASB LOQAM method listed above, and the data validation SOPs discussed in Sections 4.1 and 4.2 of this QAPP.
Precision	Refer to EPA Region 4, SESD, Field Branches Quality System and Technical Procedures, the CLP SOWs, the EPA Region 4 SESD ASB LOQAM listed above, and the data validation SOPs discussed in Sections 4.1 and 4.2 of this QAPP.
Representativeness	4 surface soil, up to 30 domestic ground water, 1 leachate, 3 surface water, 3 sediment, and 6 waste samples will be collected from the SMS property to provide a representative quantity of samples for the investigation. Refer to Figures 3 and 4 of the final SAP dated April 22, 2009 for the proposed sampling locations.
Completeness	Based on a review of the available file information, including previous sampling data and discussions with the EPA Remedial Project Manager and TDEC personnel, biased samples were proposed for collection to identify contaminant concentrations in on-site sources and to determine whether site-related contaminants have migrated to underlying ground water, to surface water, and to soil on the apartment complex adjacent to the site. Background surface water and soil samples will be collected for comparison to determine whether contaminant concentrations are elevated. (See Section 1.5, Step 5 of this QAPP for the definition of elevated.)
Comparability	In accordance with the HRS Guidance Manual, sample comparability should be achieved once all field and laboratory work are conducted using the same procedures for the respective sample matrices.

TABLE 3: EQUIPMENT AND SUPPLIES*

Site Names:	Smokey Mountain Smelters	**City, County:** Knoxville, Knox County	**State:** Tennessee

Field Instruments	Sample Containers	Sampling Equipment and Supplies	Sample Processing Supplies	Decontamination Supplies	Miscellaneous Supplies
PID/FID TVA 1000	8 oz jars	stainless steel spoons	plastic baggies	Sponges	digital cameras
Geo XT Trimble unit (2)	1 L amber jars	stainless steel auger sets	vermiculite	Brushes	permanent markers
YSI or Horiba water quality meter		stainless steel bowls	coolers	Liquinox	logbooks
Turbidity meter		aluminum pans	custody seals	deionized water	garbage bags
Geoprobe		pin flags	laptop	spray bottles	table
		gloves	printer	table	extension cord
		visqueen	paper	aluminum foil	vehicle power converter
			labels		first aid kit
			FedEx labels		
			duct tape		
			strapping tape		
			paper towels		
			2-oz jars		

Notes:

* = REAC will provide all field equipment and supplies
FID = Flame ionization detector
L = Liter
mL = Milliliter
oz = Ounce
PID = Photoionization detector